COLLEGE STUDENT'S HEALTH, DRINKING AND SMOKING PATTERNS: WHAT HAS CHANGED IN 20 YEARS?

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ABSTRACT

Problem: Post-secondary institutes are increasingly trying to address the issue of problem drinking. The purpose of this study was to determine how patterns in alcohol use and smoking by college students, as well as their illness patterns, have changed over 20 years. Methods: A cross-sectional serial survey design was used for this descriptive study. Data were collected during the 2011-2012 academic year from a convenience sample of students enrolled in a personal health course at a large Midwestern university. Data were compared to findings from the 1991-1992 academic year for the same course. Self-reported survey data regarding illness and alcohol and tobacco use were collected using the *Student Health and Lifestyle Questionnaire*. Results: Compared to 20 years ago, more males reported abstaining and fewer were classified as heavy or binge drinkers. However, the opposite was true of women, who reported less abstention and trends towards heavier drinking. The choice of alcoholic beverage changed from beer to consuming more hard liquor. Smoking was significantly decreased along with self-reported upper respiratory infections and episodes of acute illness. Conclusions: Smoking prevention efforts appear to be having a positive effect on campus health, but more gender-specific efforts may be needed to reduce the risk behavior of drinking.

BACKGROUND

Twenty years ago (1991-1992 academic year) a study of the health and lifestyle patterns of students enrolled in an elective personal health course at a large Midwestern university found that self-reported illness increased when alcohol consumption exceeded 28 drinks per week (Engs & Aldo-Benson, 1995). This project replicates that study at the same university and compares the findings to the original data to see what has changed in 20 years in terms of health, alcohol use, and smoking.

In the 1990s, a large study found that 72% of university students in the United States consumed alcohol (Engs, Hanson, & Diebold, 1996). Using the definition of more than 21 drinks per week for males or more than 14 drinks for females, the same study found that 28.4% of those students could be classified as heavy or “binge” drinkers. Engs and Aldo-Benson (1995) found that when alcohol intake exceeded 28 drinks per week students' self-reported health suffered. This association was found to be independent of the student's smoking status.

Newer definitions classify moderate drinking as up to one drink a day for females and two drinks a day for males (United States Department of Agriculture [USDA] & United States Department of Health and Human Services [USDHHS], 2005). Consumption above those limits is now considered heavy drinking. Binge drinking is a form of heavy drinking that brings the blood alcohol concentration level to 0.08% or more. This pattern of drinking usually corresponds to five or more drinks on a single occasion, generally within about two hours, for men or four or more drinks for women (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2004).

Binge drinking on college campuses is a significant public health problem associated with over 600,000 unintentional injuries, 97,000 sexual assaults, and 1,825 deaths annually, costing society an estimated 184 billion dollars in crime, health care, and loss of productivity (Hingson, Zha, & Weitzman, 2009; Gronbaek, 2009). *Healthy People 2020* states that 40% of college students binge drink, but others have found binge drinking rates as high as 63% among females and 86% among males (Gronbaek, 2009; USDHHS, 2012).

Healthy People 2020 has an objective to reduce binge drinking among college students by 10% (USDHHS,2012), but how best to accomplish this goal is not clear. The NIAAA (2002) recommends a framework combines social-cultural approaches with reduction of consumption efforts at the individual, student body, and college and surrounding community levels. One large study found that most colleges do offer educational programs to increase alcohol awareness and reduce problem drinking, with 70% using some form of web-based program (Nelson, Toomey, Lenk, Erickson, & Winters, 2010). One specific web-based program, *AlcoholEdu*® a two- step individualized program designed to address individual behavior and campus culture, is now required for approximately 36% of all incoming freshman nationwide, including the freshman and all transfer students at the study institution (Outside the Classroom, 2011). A large study of 30 campuses found that *AlcoholEdu*® reduced binge drinking and alcohol-related problems for incoming freshmen in the fall semester. However, this effect from the program did not persist into the spring semester which has been found to have higher social motives for drinking (Antin, Paschall, Ringwalt, & Saltz, 2011; Patrick, Lewis, Lee, & Maggs, 2012).

In addition to mandatory online alcohol education, another significant change at the study institution was that it was becoming smoke free. The surrounding community also had implemented smoking bans in bars and restaurants. Though nationally the implementation of community and campus smoke-free laws and policies have had little effect on drinking behaviors (Butler, Rayens, Hahn, Adkins, & Staten, 2012), there is some evidence to suggest that alcohol affects smoking behaviors. Studies have found the initiation of smoking is associated with alcohol intake, and students who may believe that smoking is unacceptable behavior in other settings may believe it is acceptable when drinking (Nichter, Nichter, Carkoglu, & Lloyd-Richardson, 2010; Reed, Wang, Shillington, Clapp, & Lange, 2007).

With the implementation of these public health strategies, the purpose of this study was to determine how the health, drinking and smoking patterns of college students at a large Midwest university have changed over 20 years. The two research questions that guided this study were: 1: How have the self-reported alcohol and smoking patterns of undergraduates at the study institution changed over 20 years? 2: How have the self-reported illnesses of undergraduates changed over 20 years?

METHOD

Procedures

To conduct this cross-sectional serial survey design study, approval from the university's Institutional Review Board was obtained. Data from the 2011-2012 academic year were compared to archival data collected from the same course during the 1991-1992 academic year. Participants were recruited through a classroom visit by the principal investigator to an elective general education personal wellness course with an annual enrollment of approximately 1,500 students. Potential participants were advised of their rights and that participation was voluntary and confidential. All students would have completed at least the first component of *AlcoholEdu*® mandated by the university. However, Part Two was not required until October, and some freshman who participated in the study early in the academic year may not have completed the entire program.

Measures

Data were collected on the *Student Health and Lifestyle Questionnaire* (SHLQ), which measures self-reported illness and lifestyle behaviors including alcohol consumption and smoking. The tool has high reported test-retest reliability (.89) and adequate internal consistency (.70) (Engs & Aldo-Benson, 1995; Engs, 1991).

Evidence of construct validity for the illness scale was gained through factor analysis. Three factors: gastrointestinal, upper respiratory infections (URI), and general malaise have been shown to account for 85% of variability and are used to calculate a weighted Total Illness Score (1.3 + 1.1[URI] + 1.6[Gastrointestinal] +1.0[General Malaise]).

The SHLQ also includes items to measure drinking behaviors from the *Student Alcohol Questionnaire* ([SAQ], Engs, 1977; Engs & Hanson, 1994). Six items ask participants to indicate the monthly frequency of beer, wine, and liquor use and the average number of each drink consumed at a time. Frequency was recoded as every day=7, two to three times a week = 2.5, once a week=1, at least monthly but less than once a week=.25, not at all=0. The quantity of drinks for each alcohol type was multiplied times the recoded frequency and summed to arrive at a weekly total of drinks. The 6-item drinking pattern scale has evidence of face validity and high reliability, with a published Spearman-Brown reliability coefficient of .84 and Cronbach's alpha of .86 (Engs &Hanson, 1994). For this study, mean numbers of drinks per week were categorized according to Engs and Aldo-Benson's (1995) original study: under 1 = "abstainer," 1-7 = "light," 8-14 = moderate," 15-21 = "moderate/heavy," 22-28 = "heavy," and 29 plus = "at risk drinker." Monthly tobacco use was also measured.

Subjects

Questionnaires were completed by 761 students. Twenty-five were eliminated due to missing data or obviously faked data, resulting in 736 for analysis compared to 1,136 participants in the original sample. The mean age of participants in the current study was 19.3 years (SD = 2.93), making the participants approximately six months younger on average than the original sample.

Data Analysis

SPSS version 20 was used to analyze data. Pearson Chi-square, independent t-tests, and ANOVA were used to test for differences. Findings were considered significant at $p < .05$.

RESULTS

Demographics

Table 1. Participant Characteristics (N=l,862) over time

	1991-1992 (N=1,126)		2011-2012 (N=736)	
Gender	%	N	%	N
Men	43.2	(487)	43.4%	(320)
Women	56.3	(635)	55.7%	(410)
Other/Unspecified	0.3	(4)	0.8%	(6)
Race/Ethnicity* **				
White	90.2	(1,016)	79.9	(537)
Black	0.7	(9)	7.3	(54)
Hispanic/Latino	0.6	(7)	3.2	(24)
Native American	0.1	(2)	0.2	(2)
Asian	1.7	(20)	13.5	(100)
Other/unspecified	1	(12)	2.5	(19)
Drinking status				
Abstainer	28.6	(323)	29.4	(217)
Drinker	71.3	803)	70.5	(519)
Smoking Status* **				
Nonsmoker	75.9	(855)	86.1	(634)
Smoker	24	(271)	13.8	(102)

Note: *** Pearson X^2 $p<.001$

Table 1 compares the demographic data from the two samples. The current sample was significantly more diverse, with more Black, Asian, and Hispanic participants (X^2 [5, N = 1862]=145.04, p<.0l). The percentage of students who reported smoking in the last month had fallen from 24% in 1991 to 14% in 2011 (X^2[1, N =1862]=28.95, p<.001). There was no significant change with respect to the number of students who reported abstaining or drinking.

Weekly Alcohol Intake and Acute Illness

Table 2 compares mean weekly alcohol intake and health scores between 1991-1992 and 2011-2012. Self-reported alcohol intake was up in the current sample. Hard liquor and wine intake had increased whereas beer intake had decreased compared to the original sample. Self-reported total illness, malaise, and upper respiratory infections had decreased significantly in the current sample, but not intestinal illness. Smokers reported more URIs (p<.001) and total health problems (p=.002) per month than nonsmokers.

Table 2. Differences in Drinking and Acute Illness

	Time	N	Mean	SD	Sig (2-tailed)
Beers/week	1991-92	1,126	8.1	12.96	
	2011-12	736	4.6	8.73	.001***
Wine/week	1991-92	1,126	0.4	1.35	
	2011-12	736	0.6	1.91	.001***
Liquor/week	1991-92	1.126	1.6	5.04	
	2011-12	736	6.9	18.72	.001***
Total alcoholic drinks/week	1991-92	1,126	10.2	15.97	
	2011-12	736	12.3	23.97	.039*
Gastrointestinal illness/month	1991-92	1,126	5.5	6.79	
	2011-12	736	5.0	5.78	.087
URI/month	1991-92	1,126	5.8	9.96	
	2011-12	736	3.7	7.74	.001***
General malaise/month	1991-92	1,126	7.9	8.55	
	2011-12	736	7.1	8.41	.043*
Total illness/month	1991-92	1,126	24.5	20.40	
	2011-12	736	20.5	18.02	.001***

Note* $p<.05$, **$p<.01$, *** $p<.001$

Figure 1: Drinking Patterns by Gender

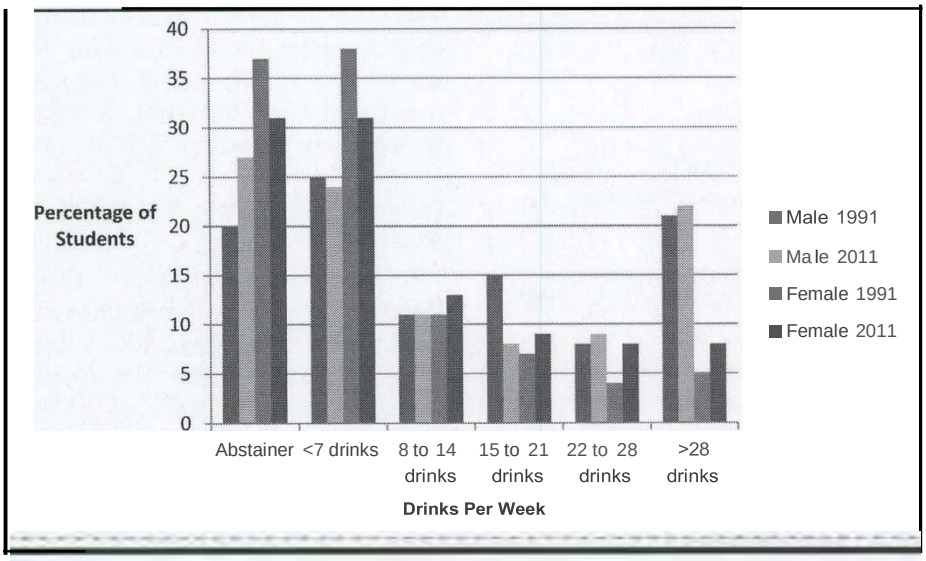

Figure 1 shows other trends in drinking patterns. Although there was not an overall change in the number of abstainers or drinkers when males and females were combined, there was a significant change in drinking patterns by gender (males X^2 [5, N = 807]=12.48, p<.03); females X^2 [5, N = 1045]=18.08, p<.003). Specifically, the percentage of males who reported abstaining rose from 20% to 27% whereas the percent of female abstainers fell from 37% to 31%. Moderate drinking at less than 8 drinks a week also fell in females, from 38% 8% for more than 28 drinks a week. If men reported five or more drinks and females reported four or more drinks on one occasion, they were further current sample only 57% of the males were binge drinkers. This decrease was significant (X^2[1, N = 807] =7.25, p<.007). On the other hand, the number of females classified as binge drinkers rose significantly, from 46% to 52% (X^2 [2, N= 1045] = 6.56, p=.01).

Self-reported Illness and Levels of Drinking

Figure 2:

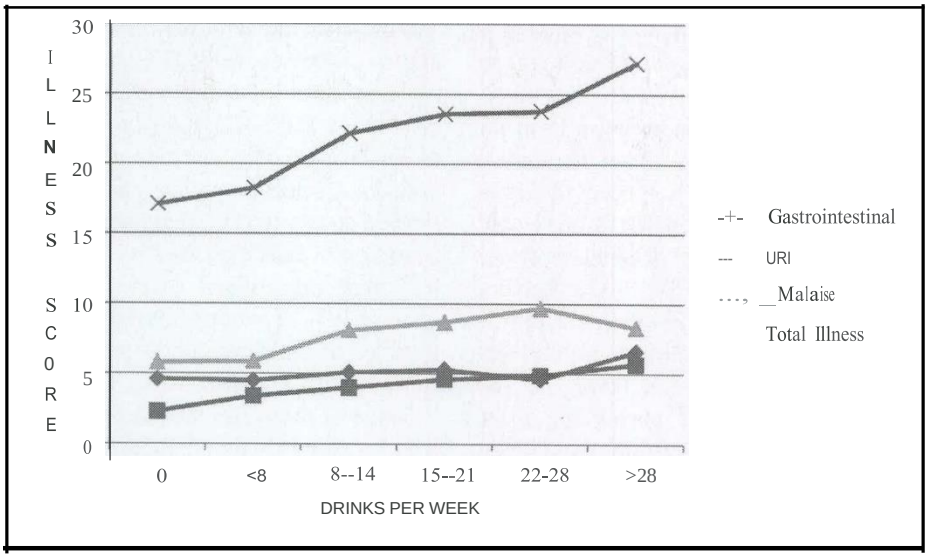

Figure 2 shows the mean self-reported illness scores for students with different weekly alcohol intakes. A significant effect for six levels of alcohol consumption on gastrointestinal illness (F[5,730]=2.28, p=.04),URIs (F[5,730]=3.46, p<.004), malaise[F(5,730)=4.74 p<.001], and total illness [F(5,1120)=6.10, p<.001] was found. Post hoc analysis using Scheffe's method found that total self-reported illness was significantly greater in those who drank more than 28 drinks per week compared to those who drank less than 8 drinks per week (p=.004) and to abstainers (p<.001). Compared to abstaining, drinking more than 28 drinks a week was also associated with more upper respiratory infections (p=.0l). No other significant pairs were identified.

DISCUSSION

Self-reported acute illness was significantly decreased in the current sample compared to 20 years ago. This study defined URI as having a cough, cold, flu, sore throat, ear infection,

bronchitis, or laryngitis in the past month. Smoking and secondhand smoke are known causes of respiratory infections (USDHHS, 2006). Even before the study university became smoke free, the surrounding community had put in place smoking bans in public places, including bars and restaurants. Therefore, it was not surprising to see the corresponding decline in the percentage of students who smoked. After the 2009 H1N1 outbreak, a universal recommendation for yearly influenza vaccination was made (CDC, 2010), and increased vaccination rates also may have factored into the decline of respiratory infections on campus. More research is warranted to determine whether the improved campus respiratory health can be attributed primarily to smoking policies.

In the original sample, Engs and Aldo-Benson (1994) found that overall illness significantly increased when students drank more than 28 drinks per week. This study reaffirmed the original study's findings that moderate alcohol consumption had little effect on self-reported acute illnesses. One interesting study finding was the general improvement in malaise, defined as headaches and lack of energy. Though the decreases in malaise were encouraging, this study offers no clear explanation for this change, making future research to understand this phenomenon important.

This sample showed an increasing preference for hard liquor over beer. This may reflect the fact that hard liquor has been found to be the preferred alcoholic beverage of choice by adolescents in high school (43.8%), followed by beer (19.2%), with a very low preference for wine (Siegel, Naimi, Cremeens, & Nelson, 2011). The preference for hard liquor may be multifactorial. Now many forms of hard liquor are less expensive than beer making it a cheaper way to become intoxicated, it can be mixed with sweet drinks to cover the taste, and it does not require acquiring a taste for the drink as beer does. A higher preference for hard liquor or beer has been observed among those with riskier patterns of alcohol consumption such as binge drinking or drinking and driving (Siegel et al., 2011). Another study of college students found that beer was more popular among moderate alcohol users than heavy users (Perera, Torabi, & Kay 2011).

The trend toward consuming more hard liquor is concerning. While the amount of liquor in mixed drinks served at restaurant or bar is a known quantity, the amount of liquor in a mixed drink served at a party is often unknown to consumers, putting them at risk for intoxication and alcohol poisoning.

All students in the current sample would have been through at least the first phase of *AlcoholEdu*®. Although the binge drinking rate of 57% found in males in the current sample was above the *Healthy People 2020* (USDHHS, 2012) target of 36%, this rate was down significantly from the rate of 67% in males 20 years ago.

More men were also categorized as abstainers in the current sample. Although the findings show improvements in drinking patterns among men, the women in this sample showed trends towards heavier drinking, this is concerning because female binge drinkers are relatively more likely to be sexually victimized or engage in unwanted sex (Ragsdale et al., 2012). The findings suggest more gender-specific efforts are needed to reduce risky drinking behaviors.

Limitations

Data were collected on self-reported anonymous questionnaires, which rely on students' honesty and recall and thus must be considered a study limitation. The study used a convenience sample from an elective course in one large Midwestern university, and therefore the data may not be generalizable to the student body as a whole or to other types of school. Furthermore, the study was descriptive and not designed to look at causes for change. The study used the SHLQ at both data collection points. The tool does not include questions related to completion of *AlcoholEdu*®. Based on course enrollment patterns and study collection dates it is estimated up to of 10% of participants may not yet have completed both phases of the program, but the exact number is unknown.

Despite these limitations this study contributes to the body of literature surrounding the complex problem of college drinking and provides support for the need for more gender-specific interventions. More research is needed to understand how best to reduce the risk behavior of drinking in females. More research is also needed to understand the full impact of smoke-free policies on student health.

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